Notebook, N-96-00-00.1

This undated notebook was used by Edison, probably in 1896, for meter or battery experiments. The book contains notes and calculations regarding tests of various electrolytic solutions and notes on amalgamating zinc electrodes with mercury. The pages are unnumbered. Approximately 35 pages have been used.

Miller =

Resistance of standard Cell
1/2 Water 1/2 Cooper CP
Sulphate Zinc –
.338 of ohm
25/1000 amalgamated Electrodes
Temperature 67.
200 cc of liquid –

Added to 200 cc of 1/2 H_2SO_4
1/2 $ZnSO_4$-Solution 20 cc of
water - mixed & put back
200 cc in jar Resistance

.335 of ohm
Temperature 68 Fahr.

diluted with 40 more
making 40 all 1 gallon
Res .315 ohm
68 1/2 =

Diluted with 20 cc
more making 60 cc altogether
Res — .309 of ohm —
Temp 69 —

added 20 cc more
making 80 cc all together
Res 312
Temp - 69 1/4 —

added 20 cc more making
100 cc altogether —
Res .309
Temp 70

added 20 cc making
120 cc all together
Res .309 -
Temp 71 -

Added 20 more making
140 cc all together
Res .310.
Temp 71

Added 20 more making
160 cc all together
Res - .315
Temp - 71

Added 200 cc more making
180 cc all together

Res - .316
Temp - 71

20 more making 200 cc in all

Res .316
Temp 71 -

20 more making 220 cc in all

Res .317
Temp - 72

Added 40 cc [illegible]
making 260 cc
Res - .334
Temp - 72

Added 40 cc more making
300 cc
Res - .345
Temp - 72

Added 40 cc making 340 cc
Res - .365
Temp - 71

Added 80 cc more
making 420 cc
Reo — .390
Temp — 71

Added 80 more —
making 500 cc —
Reo — .415
Temp — 68 —

In various additions
were errors total resulting
showing 650 cc glass —
instead of 200 + 500 as this
now increase to a total

of 1000 cc of which 200 cc
was original 1/2 + 1/2 + 800 cc
added —

Res .495

Temp — 68 —

Took 200 cc of above
solution and added
100 cc of water —

Res — .676 B Solution

Temp - 68

1450
145
395

1450
13
435
1450
1885

1450
188
1638

to B Solution added
100 cc more water —

Res — .844 .

Temp — 68 ½ .

to B Solution added
200 cc more —

Res — 1 ohm 45 hundredths

Temp — 68 ½

This solution at Temp 30 ° 7 tenths

Res — 1.670 11.45 poly 35 poly 32

200 cc of 1/2 + 1/2 Solution
to which 200 cc added
at Temp of 32.

Res	.653.	35 Fahr
"	595	40 "
"	471	45
"	434	50
"	383	55
"	365	60
"	341	65
"	321	70
	.300	75

Chart

No 1

Res	.286	80 Fahr.
"	.276	85 "
"	263	90 "
"	259	95 "
"	.247	100 "

Took 40cc of 1/2 + 1/2 sol
+ added 160cc water

Res	.362	at 100 Fahr
	395	95
	401	90
	414	85
	441	80

~~75 deg F~~

Res -	460 1/2	75 Fan
"	485 1/2	70 "
"	508	65 "
	535	60 "
	559	55
	595	50
	660	45
	703	40
	739	35

100 cc of water weighing
100 grammes — water
100 " of Sulphuric
acid weighing back
to 146 cc

Experiments on plating

No 1 40 cc 1/2 & 1/2 sol
mixed with 160 cc water

No 2. 60 cc 1/2 & 1/2 mixed
with 140 cc water

No 3 90 cc 1/2 & 1/2 mixed
with 110 cc water

No 4 120 cc 1/2 & 1/2 mixed
with 80 cc water

No 5 160 cc 1/2 & 1/2
mixed with 40 cc water

No 6 200 cc of 1/2 4 1/2

They are all placed in series with 1 cell Leland & Rossianer and kept at 5/100 of ampere to see how the deposit goes on — deposit only on the hanging electrode,

Res of Copper increases as temp rise 0.21 per cent for Each deg fahr

Run for 100 minutes with 5/100 of ampere — ~~No 2 + 3~~ 1 2 3 + 4 Solutions show slight Opalescence. No 5 only slight No 6 none at all its clear — No 3 is the most Opalescent —

Under the Microscope -

No 1. No extending nubs but plated off perfectly showing the original crystals of the Zinc - But where there were original dark spots on the Zinc after amalgamation, these spots do not seem to plate off and pieces run out therefrom not round nubs but needle like - This shows that after amalgamation no spots should show

but the cobalt chloride must be uniformly bright –

No 2 Is even better
no nubs – good –

No 3 – is good but signs
of needles at lower edge

No 4 same as No 3 – OK
there is dark spot not originally
concentrated which is allowing plated
on shows original zinc –

N05 No nubs the crystals deposited are finer and think better. There is also a bit better than the others for our purpose —

N06 is good also no nubs on slight angle very thin and brown edge

Remarks — In rolling the zinc there shows that it is one mass if cracks this must be stopped who it shows so far

that 5/1000 ampere does not produce [illegible]

2nd ~~test~~

10/100 ampere this deposit on top of 1st deposit —

No 1 CoCl. tube running out but not round + hollow but crystals sprouting outwards + apparently firmly attached don't rub off

think it would answer.

No 2 in first test showed coarse crystalline deposit; on 2nd deposit these have disappeared & the deposit is fine granulations, beautifully even all over – could not be better, no prolongation

No 3 not so fine but it shows tendency to cover up original ~~[illegible]~~ coarse

Crystals with fumes
of nitric acid at bottom
where most mercury is
that there are crystals
running out, (or needles)
freely converted. This
would show that
Excess of Hg leads to
produce crystals
producing a clot
a minimum of mercury
should be used in
amalgamating

No 4 No nubs or crystals
but deposit coarse
crystals —

No 5 Even fine crystals
no jelling nit nubs —

No 6 fairly fine crystals
no jelling out —
This shows that
10/1000 ampan well
do —

3rd test – still plating on

20/100 amp

No 1 nubs round – no

No 2 fine grain Even all over good –

No 3 uneven somewhat + tendency to nubs, some nubs

No 4 only coarse crystalline no round nubs or [illegible] cracking out

No 5 Not noby fairly fine grain no nerves but a large section has turned black — these are mushroom growths (firmly attached) they are like cauliflower

about the size.

No 6 Same as No 5 — with black cauliflower

Looks as if No 2 best

4th Test 40/100 amper

No 1 nubby all over —

No 2 nubby - black
Cauliflower all over

No 3 - Same as 2 but not
so bad

No 4 - Even coarse crystals
not nubby. no blackcauliflower

No 5 nubby - big black
Cauliflower - scrape off -

No 6 all over cauliflower
rg

Treatment Zn depends on
Copper wire showing
Cellular and not thick
Enough

Best way to remove quite
Zinc Even so to mechanically
polish + buff both sides
then benzine, then
dip in Solution of
HgCy + KCy - for couple
minutes wash + wipe
with cloth, remove till
proper Strong and ~~[illegible]~~

Say 2 minutes then rinse
+ soak in water for 1/2
hour, then dip in fresh
~~water~~ distilled water
+ dry = Coating
perfectly even.

Wrong plate among
from the suspended
Crystals of the 5 10 20
& 40 roots of unity or total
of 75 — by mistake —
5 & 10 for 40 for 200 number
the quiz 40 5 for 200
number off —

No 1 — Surface crystallization
Coarse in some spots
fine in others, melice
white oxide bottom jar
also in ~~[illegible]~~ Cavities
of Crystal, what there is

loose oxide —

PS all the cells showed gas bubbles in the morning 12 hours after the test was over —

No 2. Blow more than No 1 but there was a small patch black deposit but which disappeared touch rubbed off —

No 3 same as 2

No 4 No analysis —
[illegible] —

No 5 Lot [illegible] analysis
[illegible]

No 6 ditto —

These black stuff appears to be mostly oxide with some Zinc [illegible] that was not oxidized out on the [illegible]. The fine division of the deposit being prone to oxidation

Litmus shows that the [illegible] have an acid reaction.

Removed galvanometer now plate onto the suspended electrode

5/100 amp 100 minutes

No 1 Coarse Crystalline some round nodules

2 not Coarse, even, no nodules.

3 Little Coarse no nodules.

4 Coarse - some, nodules round

5 - Little Coarse no nodules

6 Not very Coarse, woolly patches no nodules

No 2 best.

I now put 40 drops
of 50% Sal of Morphine
used in each jar

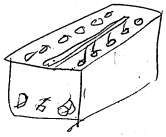
No 1 clear except
black stuff at bottom
which is prob Cauliflower
black zinc or other metal

No 2 Don't clear so well
little milky - very little blk
No 3 + 4 clear with
very little black stuff
Nos 5 + 6 don't clear only little
+ lots black stuff in
bottom —

plate on suspension electrode
5/100 amp 100 minutes.

Acid solution very bad
bubbles awful

I now put new solution
in 60 of 1/2 + 1/2 140 water
in all 4 —
& new electrode amalgamated
by dipping in NaCy KCy —
5/100 amps — 200 minutes
left it on 12 hours —
granular deposits but fairly
& coherent, solution not milky
CyHy process is OK —



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